

(12) UK Patent Application (19) GB (11) 2 047 104 A

- (21) Application No 8003943
 (22) Date of filing 6 Feb 1980
 (30) Priority data
 (31) 1019/79
 (32) 12 Feb 1979
 (33) Austria (AT)
 (43) Application published
 26 Nov 1980
 (51) INT CL³
 B01F 7/10 //
 B02C 13/22 19/18
 (52) Domestic classification
 B1C 19G1 1 34X
 B2A 7A3 7E 7P1 7R9 7RX
 (56) Documents cited
 GB 2006737A
 GB 1474550
 GB 1388889
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 GB 1187399
 GB 1084112
 GB 1073084
 GB 806085
 GB 665981
 (58) Field of search
 B1C
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(54) Method and apparatus for treating water

(57) A method of treating water, more especially for the purpose of improving the growth promoting properties thereof, characterised by the feature that the water is subjected to mechanical impacts having a minimum frequency of three impacts per 10th of a second by the moving parts 29, 30 (the rotors) of a disintegrator. The water may additionally be subjected to a magnetic and/or electrostatic field.

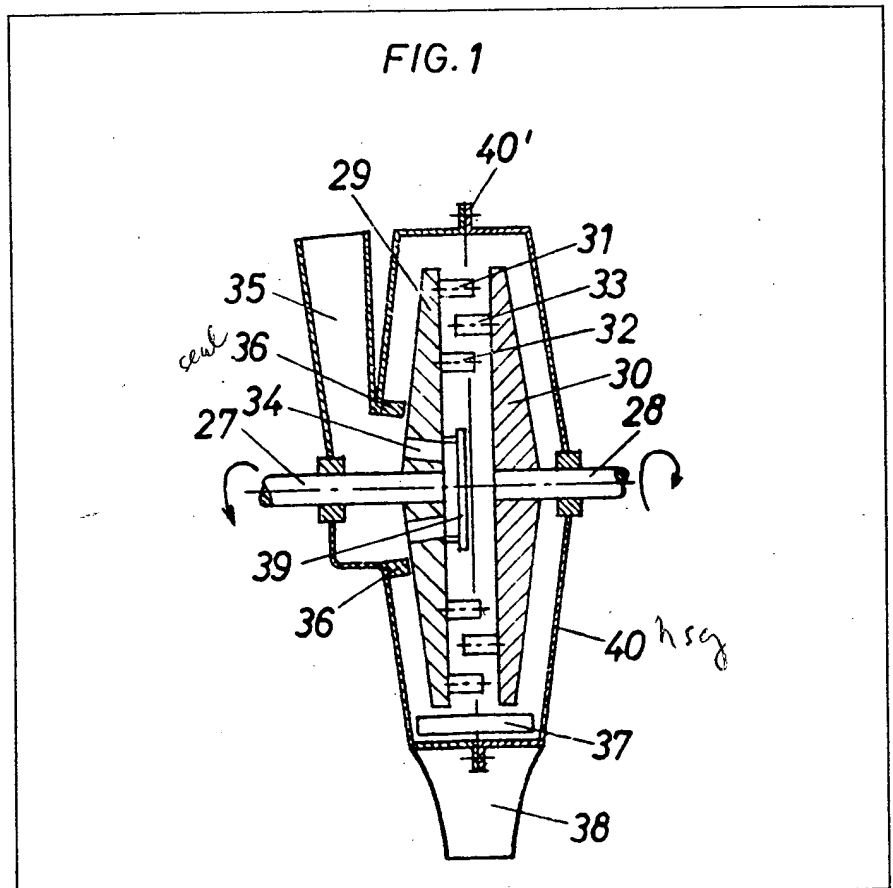


FIG. 1

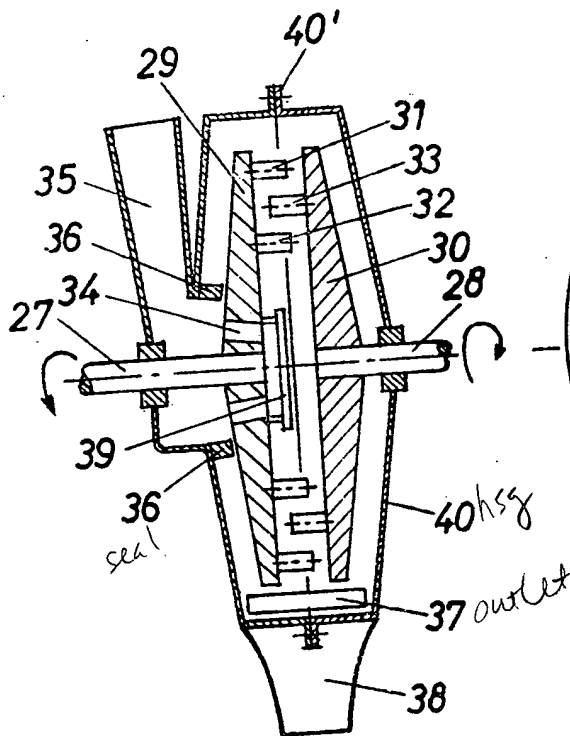


FIG. 2

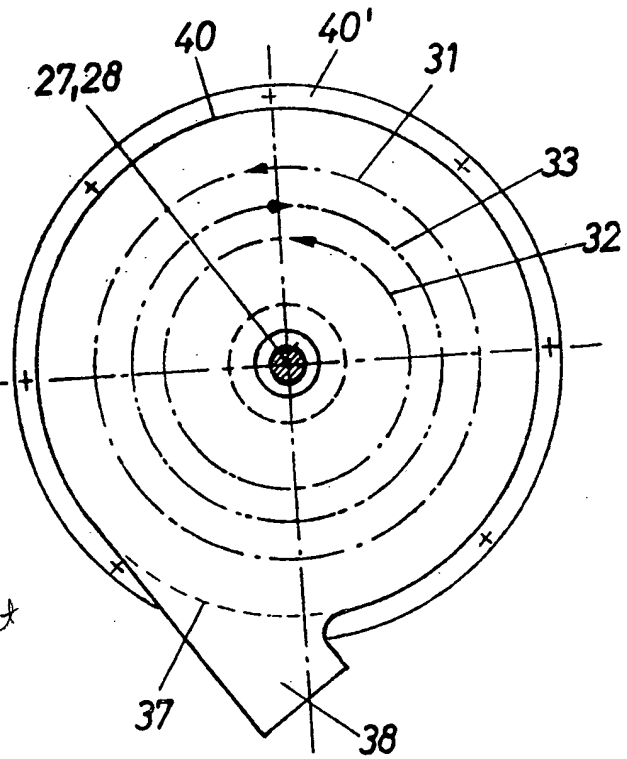


FIG. 3

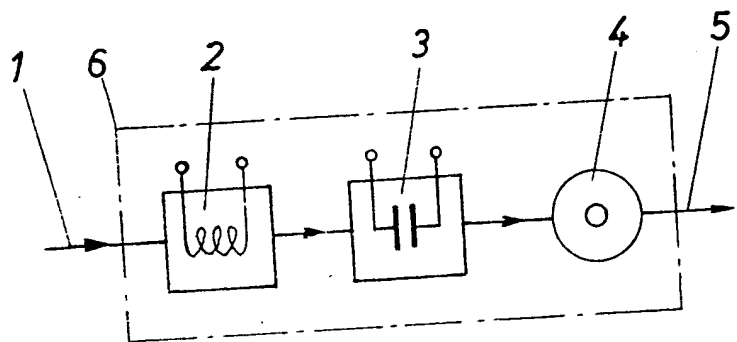


FIG. 4

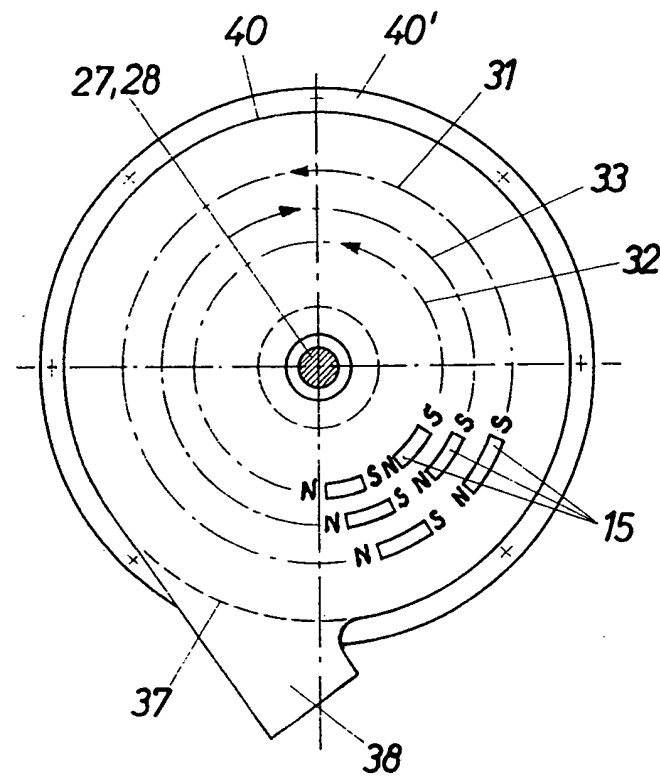
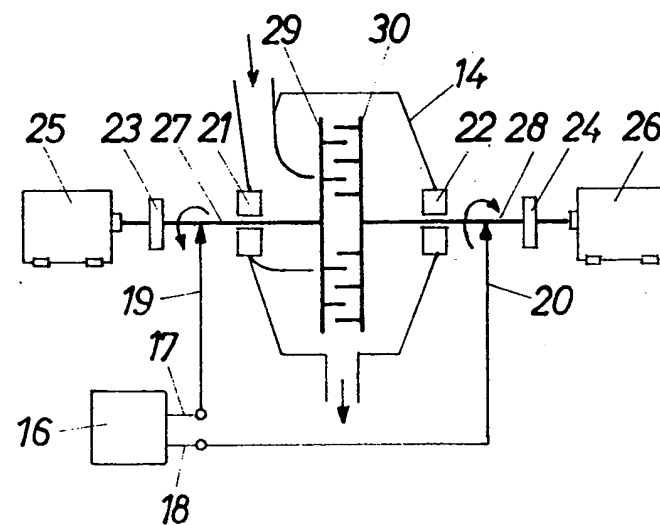


FIG. 5



SPECIFICATION

Method and apparatus for treating water

- 5 The present invention relates to a method of treating water, which is especially to be used as a growth promoting agent, for the purpose of changing its molecular structure and its molecular energy state. Water intended to be used as washing or cleaning agent should be mentioned as further field of application. 5
- The invention also relates to a disintegrator for carrying out the water treatment method.
- For various intended uses, such as, for example, for watering useful plants and decorative plants and for 10 the watering of animals, rain water has been used for a long time and which is of particular purity, and has increased effectiveness with reference to the above and similar intended uses if it is freshly collected. This increased effectiveness is, among other factors, attributable to electric influences which the water is subjected to in the form of clouds in the atmosphere and in the form of drops on its way to the ground. 10
- In pursuance of this concept numerous devices have been designed internally by us and proposed to 15 impart to the water not only the properties in purity as rain water, but also the more active properties in purity of spring and well and surface water, thus containing hardening agents and the like. Herewith by the influences of magnetic fields and those from electric fields but such have not provided satisfactory results. 15
- To overcome washing and cleaning problems in the household, trade and industrial water is rarely used on its own but is mostly used in conjunction with surfactants and other additives which more or less wet 20 hydrophobic dirt substances and detach them from their support by rinsing beneath them, and it is also known to emulsify or to adjust a favourable pH value therefor or the precipitation of reaction products from substances dissolved in water such as salts causing hardness with washing additives or dirt substances or of insoluble products produced by thermal decomposition from carbonate salts causing hardness being desirable to avoid. 20
- 25 It has been repeatedly shown that various such substances are very favourable with reference to the purpose directly aimed at, but are extremely disadvantageous with reference to the further utilization of the used water, its purification and reincorporation into the natural circulation. Thus, in particular, the active wetting agents are often hardly biologically reduceable; phosphates whilst successfully preventing the precipitation of boiler scale and of calcium soaps, later on bind in nature trace elements important to ecology 30 or cause pronounced excess fertilising; and quite generally all chemical additives encumber and load water purification plants as also the natural process of self-cleansing of waters. It is therefore certainly in the interest of the community to find and use processes through which such loadings may be restricted to a minimum without for this reason having to limit or neglect the actual original purpose - in this case the purification. 30
- 35 It is generally known that water and particularly soft water is particularly suitable for washing textiles and the required washing effect can be attained with far less soap, the oldest known wetting agent, than say with water from springs or brooks in limestone mountain ranges. This advantage of rain water results from the absence of salts causing hardness, but was previously attributed to the action of electric fields and discharges, which act on the rain water in the clouds and during the falling of raindrops through different air 40 layers.
- Further there has not been any lack of experiments for the purpose of reducing furring to subject water to electrical or magnetic fields. Numerous devices have been developed and used by us internally, and there have been numerous investigations carried out concerning the effects of such devices which, depending upon the type of devices, their application and the experiment conditions, led to most varied results, and 45 gave rise to doubts.
- The effects in the water obtained by means of electrical or magnetic fields have to date, however, not brought any satisfactory results.
- To be mentioned as literature examples in which, in a variety of ways and for diverse purposes, the mechanical treatment of water or waste water has already been proposed are US-PS 3,893,921 which 50 describes a vibratory treatment during flocculation; US-PS 3,585,963 which discloses the production of periodic pressure waves for sterilisation, GB-PS 897,168 discloses the production of oscillation waves in water by mechanical action, and as a further literature reference Ge-PS 845 946 relates to the use of sonic waves.
- Finally, Fr-PS 1,528,622 illustrates the production of turbulent currents by means of discs rotating 55 oppositely to each other in the course of purification of aqueous solutions and, more especially, salt solutions.
- The object of the invention is thus to provide a method and an apparatus which imparts or impart the required active properties to water so as to obtain a growth promoting effect. Moreover, conventional solvent additives are to be partly or wholly dispensed with.
- 60 This object is attained in accordance with the invention in that the water is subjected to powerful mechanical vibrations by the action of movable parts (the rotors) of a disintegrator. If necessary, a magnetic field and/or an electrostatic potential field may act additionally, simultaneously or in alternating succession on the water. The treatment is carried out in such a manner or for such a length of period until water molecular units ("Cluster") of about from 100-300 water molecules have formed in the liquid. Water obtained 65 in this manner may influence the hydrogen bridges and hence their molecular structure in protein molecules

and nucleic acids. Moreover, the water may, for example, be used for the preparation of detergent solutions free from complex metal ion formers.

It has been shown that solid substances, due to a comminuting treatment in machines and appliances, and which, because of their structure are suitable to impart to the treated substance, up to ten impacts at speeds ranging up to the speed of sound, display properties which cannot be explained by the pure surface increase.

If it is possible to explain the changes of solid substances, for example, besides by surface increase and by charging latent energy, and thus at the same time permitting an explanation as to why such activations remain partially constant over very long periods of time, it was not necessary to assume that time-stable energy storing changes can also be caused as the freely displaceable molecules.

10 In comparison with electrostatic or magnetic field influences, the effects of extremely brief and at the same time very intensive mechanical influences on water and also on solid substances are completely different. Known disintegrators, i.e. modified pinned disc mills, and squirrel cage mills with high impact speeds up to several hundred metres per second permit the substance treated therein to have an accurately defined number of impacts or beats of accurately identified intensity imparted thereto within an accurately defined 15 time period measuring only fractions of seconds. With solid substances such an influence not only has a mechanical comminution effect, but also brings, for example, stable interference points or a stable interference pattern into the lattice or grid. Such interference points are storage means of latent energies which may be further utilised to trigger or accelerate chemical and physio-chemical reactions.

What in solid substances have timed duration as lattice changes was not necessarily to be expected as 20 time-stable energy storing changes on freely displaceable molecules of liquids. Numerous experiences, however, have shown that even if, for example, water as such a liquid on its own does not need to be able to permit such storages over a long period of time, it is well suited to transmit absorbed energy from mechanical sources within the duration of storage of about 24 hours in the water molecules to other substances dissolved in water or wetted thereby, so that lastly a noticeable change occurs in the whole 25 system.

It has, for example, also been observed that it is possible to multiply the propagation of uni-cellular organisms on liquid nutrient mediums when the liquid nutrient mediums are subjected to the treatment in a so-called disintegrator.

Furthermore, it has been established that multicellular plants clearly show propagated growth when 30 watered with water which also has been treated in disintegrators.

It has also been found that animal organisms, e.g. tadpoles, in water grow more quickly and larger in water treated by an integrator than in normal water.

Finally it has been found that domestic animals which are fed with fodder which has been treated in disintegrators put on more flesh than those fed conventionally, and that the metabolisms of such animals 35 are stimulated and influenced usefully in accordance in a positive sense by drinking water also treated in disintegrators.

The treatment of water for the purpose of irrigation and watering of domestic animals, the forming of nutrient media for supplying protein or other breeding of microorganisms in disintegrators causes the purpose directed usefulness of this water to increase and, depending upon the use, may cause a stronger 40 and healthier additional growth of vegetable or animal substance attained. Favourable effects are especially obtained in many cases if the mechanical effect of a disintegrator is combined with the effect of a magnetic and/or electrostatic field, either simultaneously with or preceding or directly following in line the mechanical action.

Considerable specific results shown below by example are attained which are not only qualitatively but 45 also quantitatively noticeable.

Watering larger production areas with activated water caused an additional growth in tomatoes of 35%, cucumbers over 60% and the number of rose blossoms increased to over 30%. Besides the increase of yield, a better quality and a substantially more rapid ripening of the yield was attained.

Experiments with warm blooded creatures (rats) resulted in increased growth of the young rats subject to 50 the action of activated water and was accelerated by about 60%.

Furthermore, the use of activated water in connection with fish caused such to spawn sooner and such showed a greater resistance to conventional diseases contracted in untreated water.

Experiments with water plants (hydrocultures) also resulted in a substantial improvement of the speed of growth or the yield.

55 The subject matter of the invention hence relates to a method of controlling the properties of water by influencing the molecular structure by frequency action by means of mechanical impacts in a disintegrator apparatus preferably of defined power, number and time sequence. This method therefore is suitable to convert water into a state which has both inherent variable solution, separation, precipitation and combination properties.

60 In such a manner it is also possible to influence the hydrogen bridges in large protein molecules of vegetable and animal organisms, which as enzymes control the interplay of all biological reactions, and also to influence the molecules of the nucleic acids.

In pursuance of the inventive concept of the energy influencing of water for the purpose of increasing its solvent capability for substances normally not soluble or emulsifiable without specific additives or only with 65

reduced amounts of additives of wetting agents and conditioning means, it has been found that the treatment of water in disintegrators makes such more absorbent of, for example, fats. As such fats in water are neither soluble nor emulsifiable without additives. However during treatment in a disintegrator emulsification occurs, either in low concentration without additives or in high concentration in the presence of only minute quantities of supporting additives.

It has further been found that with the presence of sodium carbonate as a conditioning additive, fats are saponified more rapidly at far lower temperatures if the soda solution and fat emulsion are subjected to the treatment in the disintegrator. Soaps formed herewith automatically act as emulsifiers and emulsion stabilisers and wetting agents, thus they assist the effect of the method without the formation of additives which are biologically difficult to reduce and environmentally harmful, but, moreover, act out of themselves. It has also been found that the whole washing liquor does not have to be passed through the disintegrator in order to obtain the required effects but only a circulating partial stream may be treated.

It is thus realised that already the mechanical-chemical effect of the disintegrator is suitable to influence the molecular association of the water. Furthermore, it is shown that a simultaneous or directly subsequent or preceding action or influence of a magnetic and/or electrostatic potential field is suitable to supplement and increase the mechanical-chemical effect. The method described hence not only permits the dissolving properties of water to be changed without the requirement of additives of any kind, but also permits a change of the properties of the water with regard to separation and precipitation operations. Hence the method is suitable for converting water into an activated state which, on the one hand permits it alone and without combination with other substances to act on account of the influenced molecular structure and, on the other hand, to dissolve compounds with other substances on account of the influenced molecular structure, and especially to change and intensify by influencing the stability and the behaviour of nucleic acids.

As particularly essential has been found the circumstance that the effect of the method in accordance with the invention, applied to the treatment of water which is used in washing machines, dishwashers and cleaning appliances and machines, as a whole or in recycled partial streams, in disintegrators for the purpose of charging mechanical energies in the form of numerical and strengthwise defined impacts within a time period defined in length depending upon the required strength of the activation effect which may be carried out as such, or in combination with the simultaneous, or briefly subsequently following influence of a magnetic or electrostatic potential field or both.

The invention will be described further, by way of example, with reference to the accompanying drawings, in which:-

Figures 1 and 2 illustrates the structure of a disintegrator in cross-section and side view respectively and for carrying out the method in accordance to the invention,

Figure 3 shows the structure of a disintegrator in side view and having devices for producing a quasi stationary magnetic field; and

Figures 4 and 5 each show a schematic view of an apparatus with devices for producing an electrostatic field.

Figures 1 and 2 show the main structure of a disintegrator. Axially aligned shafts 27 and 28 each have a rotor 29, 30 secured on one end.

One of these rotors 29 is provided close to the centre passage with apertures 34 for the passage of activating water. A baffle and guide plate 39 is located in front of the apertures 34. In front of the apertures 34 there is a space 35 through which water is let in. Sealing rings 36 prevent the water from entering outlet space 38 through outlet aperture 37 at the outside of the rotor 29 whilst by-passing impact pins in the rows 31, 32 and 33.

The rotors are enclosed by a housing 40 which may be opened along flange 40'.

The drawing shows that alternate rows of impact pins are moved in opposite directions and this provides very high impact speeds.

Devices of the kind described have been known for a long time as modified pinned disc mills. A common feature of these is that the impact pins have a cylindrical cross-section, whereby with reference to the water particles accelerated thereby, such provides a considerable directional scattering. For the object of the subject matter on the other hand an apparatus with non-cylindrical impact elements is suitable and which is able to impart a directed acceleration to the particles of water.

Water is fed centrally axially and engaged by the suction and centrifugal force and spun outwardly. The water thus arrives in the impact range of the innermost row of pins and has a substantially tangential acceleration imparted thereto which is converted by the next outer oppositely rotating row of pins into an opposite, also substantially tangential acceleration. This is repeated from one row of pins to the other until the particles of water leave the region of the rotors. Impact speeds of from 25 to more than 300 m/sec are attained and produced by the speed of the discs and the radii of the rows of pins. By varying the speeds the effect of the mechanical-chemical activation and the energy to be stored by the particles of water are to be influenced.

The rotors 29, 30 located in the housing 40 may be driven from the outside in opposite directions by directly coupled motors, whereby up to eight or ten rows may be provided in all, which due to the contra rotation of the rotors 29, 30 also rotate alternately, contra rotating, whereby high relative impact speeds are attained. Therefore, expediently according to size, number of impact baton rows and speed, the layout is

such that the water passed through receives 3 to 20 impacts at from 25 to 300 m/s impact speed within a period of from 0.1 to 0.01 seconds. Between the individual impacts there may be a time period of 10^{-3} seconds.

In the embodiment of Figure 3 an installation is shown having a device for producing a magnetic and electrostatic potential field. The numeral 1 indicates the supply/feed pipe for the water to be activated. From the supply pipe 1 water is conducted to a magnetic field unit 2 and then to an electrostatic potential unit 3 and thereby subjected to the magnetic and/or electrostatic field. From the electrostatic potential field unit 3 the water passes into the disintegrator 4 and from there into discharge pipe 5. The units listed may be located separately or in a common housing. The units 2 and 3 may, for example, also be arranged after the disintegrator 4.

It is also possible to provide a combination of disintegrator 4 and magnetic field unit 2 and/or electrostatic unit 3 in an overall unit. Beater or impact elements 15, as shown in Figure 4, may, for example, be adapted as permanent magnets, so that material particles are simultaneously subjected to a magnetic field, whereby the direction of the magnetic field is optionally aligned radially, tangentially or axially parallel to the rotors or the impact elements. The north-south direction (NS direction) with the tangential direction of the magnetic field of the permanent magnets of successive impact elements 15 may be constant within a circular row in tangential direction, and as, for example, shown in Figure 4, thus NS-NS-NS or alternately reversing, i.e. NS-SN-NS. The same applies to the axially parallel alignment of the magnetic field.

In accordance with a further embodiment (not shown) the rotors 29, 30 may be made of a permanently magnetic material and thereby build up a stationary, magnetic field, whereby the direction of the magnetisation extends axially parallel.

Hereinafter an embodiment for building up an electrostatic field is described with the aid of Figure 5. The rotors 29, 30 herewith form the electrode plates of a capacitor which is connected to an electric power source 16. The voltage is applied by the terminals 17, 18 to the sliding contacts 19, 20 and via the axles 27, 28 to the rotors 29, 30 which are accordingly charged and build up a stationary, electrostatic field between both rotors. The axles 27, 28 are mounted in the housing 14 in insulated bearings 21, 22 and are driven in opposite direction via insulating couplings 23, 24 by the motors 25, 26. In accordance with a further embodiment (not shown), the impact elements may be formed as an electret or contain such, whereby for the direction of the electric field and for the alignment of the polarity (positive-negative direction) the same arrangement possibilities are given as already described in detail in identical manner for the permanent magnets.

Generally according to a further embodiment (not shown) it is also possible to replace the permanent magnets by electric magnets, or replace the electrets by suitable electrode arrangements subject to the voltage.

The results of germination experiments on garlic compound bulbs with activated water are now given:-

35 List of abbreviations:

| | | |
|-----------------------|---|----|
| K | control sample, non-activated water | 35 |
| 1D | once activated water | |
| 1Df | once activated water filtered | |
| 5D | five times activated water | |
| 40 5Df | five times activated water filtered each time | 40 |
| 1MD | water activated once with magnetic pin rotors | |
| 2MD | water activated twice with magnetic pin rotors | |
| 5MD | water activated five times with magnetic pin rotors | |
| 1MD | 1MD filtered | |
| 45 5MDf | 5MD filtered each time | 45 |
| 5MDfk | 5MD boiled for 1 minute | |
| 1Df* or 1MDf* or 5Df* | activated for starting experiment. | |

The experiments described hereinafter were all carried out at room temperature.

1st Experiment:

Disintegrator: Rotors made of stainless steel pins

V_{max}: 120 m/sec

55 *Parallel experiments:* 0 Time period of experiment: 7 days

Culture base: pure sand

Vessels per test: 1

Bulbs per vessel: 15

| 60 Test | Type of water | Time topped up after 3 days | Water additive Type of water | Weight increase relative to K | 60 |
|---------|---------------|-----------------------------|------------------------------|-------------------------------|----|
| K | tap water | | tap water | | |
| 65 5D | 5D | | tap water | 16.4% | 65 |

*2nd Experiment:**Disintegrator:* magnetic pin rotors*Vmax:* 225 m/sec5 *Parallel experiments:* 1 *Time period of experiment:* 8 days*Culture base:* fractionated granite:*Vessels per test:* 2*Bulbs per vessel:* 30

5

| 10 Test | Type of water | | Water additive Type of water | Weight increase relative to K | 10 |
|---------|--------------------|--|---------------------------------|----------------------------------|----|
| K | distilled water | Time after 3 days water ex- tracted and then topped up | distilled water | | |
| 15 | | | | | 15 |
| 5MD | 5MD | | distilled water | 23% | |

*3rd Experiment:**Disintegrator:* Magnetic pin rotors*Vmax:* 225 m/sec*Parallel experiments:* 225 *Culture base:* glass tube base*Vessels per test:* 3*Bulbs per vessel:* 25

25

| 30 Test | Type of water | | Water additive Type of water | Weight increase relative to K | 30 |
|---------|--------------------|---|---------------------------------|----------------------------------|----|
| K | distilled water | Time after 3, 6 and 10 days resi- dual water is extrac- ted and then topped up | distilled water | | |
| 1MDf | 1MDf | | distilled water | 23% | |
| 35 | | | | | 35 |
| 5MDf | 5MDf | | distilled water | 27% | |
| 5MDfk | 5MDfk | | distilled water | 26% | |
| 40 | | | | | 40 |

*4th Experiment:**Disintegrator:* Hard metal pin-(1D) or magnetic pin rotors (1MD)45 *Vmax:* 225 m/sec*Parallel experiments:* 9 *Time period of experiment:* 12 days*Culture base:* Saucers*Vessels per test:* 10*Bulbs per vessel:* 15

45

Alternative I

| Test | Type of water | Time after every | Water additive Type of water | Weight increase relative to K | |
|---------|-----------------|---|---------------------------------|----------------------------------|----|
| 5 a) K | distilled water | 2 and 5 days | distilled water | | 5 |
| 1Df | 1Df | residual water extracted and then topped up also on 7th and 9th day | distilled water | | |
| 10 1MDf | 1MDf | | distilled water | | 10 |
| 15 b) K | | | distilled water | | 15 |
| 1Df | | | 1Df ^x | 60% | |
| 1MDf | | | 1MDf ^x | 30% | |

Alternative II

| | | | | | |
|--------------------------|--|--|-----------------|-----|----|
| 20 a) like Alternative I | | | | | 20 |
| b) K | | | distilled water | | |
| 1Df | | | 1Df | 53% | |
| 25 1MDf | | | 1MDf | 37% | 25 |

5th Experiment:

| | |
|---|--|
| <i>Disintegrator:</i> Hard metal pin rotors | |
| <i>Vmax:</i> 225 m/sec | |
| 30 | <i>Parallel experiments:</i> 4 <i>Time period of the experiment:</i> 13 days |
| <i>Culture base:</i> glass pipe/tube base | |
| <i>Vessels per test:</i> 5 | |
| <i>Bulbs per vessel:</i> 13 | |

| 35 Test | Type of water | Time after every | Water additive Type of water | Weight increase | 35 |
|---------|-----------------|---|---------------------------------|-----------------|----|
| K | distilled water | 2,3,4,7,8 and 10 days | distilled water | | |
| 40 1Df | 1Df | residual water extracted and then topped up | 1Df ^x | 35% | 40 |
| 5Df | 5Df | | 5Df ^x | 48% | |
| 1Df' | 1Df | | 1Df | 28% | |
| 45 5Df' | 5Df | | 5Df | 47% | 45 |

The following conclusions could be drawn from the experiment results obtained:

1. The processing (activation) of the water in the disintegrator increases its capacity to accelerate the germination of garlic tubers. This increased capacity of the water is moreover called its biological activity.
- 50 2. The increase of the maximum baffle or rotor speed from 120 m/sec to 225 m/sec increases the weight increase of plants from 16% to twice this value.
3. The processing of the water in the disintegrator with magnetic pin rotors does not increase the biological activity thereof, but reduces it in comparison to that water treated in the same disintegrator with conventional non-magnetised rotors (Experiment 4, first and second alternatives).
- 55 4. When the water used up during the experiment (evaporated or absorbed by the bulbs) is replaced by activated water, the weight increase of the plants increases (Experiments 3 and 4).
5. Freshly activated water in the course of the experiment and water activated before the beginning of the experiment, over a time period of days exhibits no substantial differences with regard to the biological activity (Experiment 5). This proves that biological activity of the water treated in the disintegrator is
- 60 relatively lasting.
6. The activation of the water in the disintegrator during the same period causes the weight increase of the plants to be increased up to 50%.
7. The 5 times activation of the water in the disintegrator in comparison with the single activation provides a lesser increase of the biological activity (Example 5) than the increasing of the rotor speed
- 65 (Experiment 1 and others).

CLAIMS

1. A method of treating water, more especially for the purpose of improving the growth promoting properties thereof, characterised by the feature that the water is subjected to mechanical impacts having a minimum frequency of three impacts per 10th of a second by the moving parts (the rotors) of a disintegrator. 5
2. A method according to claim 1, in which in addition the water is additionally subjected, simultaneously or successively, to the influence of a magnetic field of static and/or dynamic kind and/or to an electrostatic potential field of static and/or dynamic kind.
3. A method according to claim 1, wherein the treatment is carried out in such a manner or for such a time until in activated water molecule units ("clusters") each of from 100 - 130 water molecules have formed. 10
4. A method according to claim 1, wherein protein molecules and nucleic acids and hence the molecular structure of the hydrogen bridges are influenced.
5. A method according to claim 1, in which the dynamic magnetic field and the dynamic, electrostatic field comprises a frequency of from a few Hz to a few GHz, preferably coming, however, to grid or border frequency. 15
6. A method according to claim 1, in which the water is subjected to at least from 3 to 20 impacts during a time period of from 0.1 secs. to 0.01 secs.
7. A method according to claim 1, in which the water in an unheated or only moderately heated state is subjected to powerful mechanical oscillations and/or magnetic field and/or electrostatic field.
8. A disintegrator apparatus for carrying out the method according to claims 1 and 2, characterised by two oppositely driven, parallelly arranged rotors, which alternately support beater or impact elements in circular rows of increasing diameter, whereby devices for producing electrostatic and/or magnetic fields are provided outside or inside the disintegrator. 20
9. A disintegrator as claimed in claim 8, in which the device for producing a magnetic field is provided within the disintegrator, whereby the impact elements of the rotors of the disintegrator are adapted as permanent magnets or contain such, and in which the direction of the magnetic field is alternately aligned radially, tangentially or axially parallel to the rotors. 25
10. A disintegrator according to claims 8 and 9 in which the North-South direction of the magnetic field of the permanent magnets of successive impact elements is constant within a circular row in tangential direction or alternately reversed. 30
11. A disintegrator according to each of claims 8 and 9, in which the North-South direction of the magnetic field of the permanent magnets of successive impact elements in a radial direction on the circular rows of alternately increasing diameters is constant or is alternately reversed.
12. A disintegrator according to claim 8, in which the rotors are mounted electrically insulated and are connected to poles of a voltage source. 35
13. A disintegrator according to claim 8, in which the device for producing an electrostatic field is provided within the disintegrator, whereby the impact elements of the rotors of the disintegrator are formed as electrodes or contain such, and the direction of the electrostatic field is optionally aligned radially, tangentially or axially parallel to the rotors.
14. A disintegrator according to any of claims 8 to 13, in which the positive or negative direction of the electrostatic field of the electrets of successive impact elements is constant within a circular row in tangential direction, or is alternately reversed. 40
15. A disintegrator according to claims 8 and 13, in which the plus-minus direction of the electric field or the electrodes of successive beater elements in radial direction towards the circular rows of alternately increasing diameters is constant, or alternately reversed. 45
16. Apparatus for carrying out the method according to any of claims 1 to 7, including a supply pipe for supplying the water to be activated and connected to a magnetic field unit, and an electrostatic field unit connected to the magnetic field unit, a pin mill acting as a disintegrator which is provided with two oppositely driven parallel arranged rotors, supporting impact pins in circular rows of alternately increasing diameter, and a discharge pipe, whereby the portions are possibly located in a common housing. 50
17. Apparatus according to claim 16, in which the magnetic field unit and the electrostatic field unit are connected subsequent to the disintegrators.
18. Apparatus according to claim 16, in which after the supply pipe there are arranged the disintegrator and the magnetic unit in succession or in reversed sequence.
19. Apparatus according to claim 16, in which after the supply pipe there are arranged the disintegrator and the electrostatic field unit in succession or connected in reversed sequence. 55
20. Apparatus according to claim 16, in which after the supply pipe only the disintegrator is connected.
21. Apparatus according to claim 16, in which the magnetic field unit is formed by an electric magnet and/or by a permanent magnet.
22. Apparatus according to claim 16, in which the electrostatic field unit is formed by electrode plates or by an electret. 60
23. A method of treating water substantially as herein described and illustrated.
24. Water whenever treated in accordance with the method of claims 1 or 23.
25. A disintegrator substantially as herein described and illustrated with reference to the accompanying drawings. 65

26. Apparatus for carrying out the method as claimed substantially as herein described and illustrated with reference to the accompanying drawings.

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